

REMARKS

Claims 1-64 are pending in the instant application, with claims 1-4, 7, 8, 10, 12-25, 34, 37-43, 46, 51-60, 63, and 64 rejected and claims 5, 6, 9, 11, 26-33, 35, 36, 44, 45, 47-50, 61, and 62 objected to. Applicant is grateful for the indication of allowable subject matter but respectfully disagrees with the examiner's various rejections for the reasons detailed below.

Obviousness under 35 U.S.C. § 103(a) serves as the basis for all of the examiner's rejections, with U.S. Patent No. 6,473,467 to Wallace et al. presented as the primary reference in all such rejections. For example, the examiner rejects claims 1, 2, 7, 10, 13, and 14 as being obvious over Wallace in view of U.S. Patent 6,577,686 to Koga et al. In making an obviousness rejection, the examiner carries the initial burden of making out a prima facie case of obviousness, which requires that the prior art reference (or references when combined) must teach or suggest all the claim limitations, that there be some motivation or suggestion in the prior art to modify or combine the references, and that there be a reasonable expectation of success. In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Claim 1 of the instant application claims a method of coherent transmit diversity and includes the limitations of "forming a plurality of transmit signals, each comprising a combination of information signals intended for different ones of a plurality of wireless receivers, such that, at each one of said wireless receivers, the intended information signals in the plurality of transmit signals add while the other information signals cancel," and "coherently transmitting said transmit signals from said plurality of transmitters over different propagation channels to said plurality of receivers."

Thus, to make claim 1 obvious, at a minimum, the combination of Wallace and Koga must teach or suggest coherent transmit diversity wherein a plurality of transmit signals comprise combinations of information signals intended for different receivers and are formed such that the transmit signals combine at each intended receiver in a manner that adds each receiver's intended signals and cancels the signals intended for other receivers. This desirable effect must be a property of how the transmit signals are formed at the transmitter(s).

The examiner explicitly states that Wallace does not disclose the claimed signal cancellations but alleges that Koga supplies the missing limitation. Respectfully, Koga is not even in the obviousness ballpark regarding its signal cancellation teachings. Specifically, the examiner cites to col. 1, lines 54-57 of Koga as teaching signal cancellation limitation of claim 1 in the instant application. All that the cited passage teaches is that a diversity receiver may compute weighting coefficients, W_k , that tend to cancel received interference and to intensify the desired signal. Such is common practice in RAKE receivers, for example, wherein RAKE combining weights are applied to the output signal from each RAKE "finger" to gain beneficial signal combining at the receiver.

However, such operations have nothing whatsoever to do with forming the original transmit signals in a manner that results in the inherent cancellation of unwanted signals and addition of wanted signals at each receiver. That is, with the present invention, the entities transmitting the plurality of transmit signals actively form those signals such that the signals themselves provide the desired cancellation and addition at each receiver's antenna independently of any processing that might be done

by the receiver. Koga does not teach what the examiner suggests that it does, the combination of Wallace with Koga does not teach or suggest the claimed invention, and the examiner's obviousness rejections based on the combination of Wallace and Koga fail as a matter of law.

Beyond the combination's plain failure to teach or suggest all of the claimed limitations, it is utterly unclear how the teachings of Koga can be applied to Wallace. As cited by the examiner, Koga teaches diversity combining at a receiver for reasons of interference cancellation. The receiver is concerned only with its desired signal and thus considers everything but the desired signal as interference, which greatly simplifies its combining task. That type of received signal combining teaches nothing regarding the complex operations required to form transmit signals in such a way that inherent cancellation/addition occurs at the point of signal reception for a given remote receiver.

That is, it is believed that the passages cited in Koga by the examiner disclose teachings that are inoperative in the context of Wallace. No motivation to combine can exist where the combination would be inoperative. Even if, for argument's sake, Koga could be combined with Wallace, that combination has no relevance to the invention of claim 1 and, even if it did, the examiner has provided no showing of a motivation to combine Koga with Wallace. Instead, the examiner offers the conclusory statement that "it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Wallace, and have the other information signals cancel, as taught by Koga."

The Federal Circuit consistently has rejected such "rote invocations" as insufficient to supply a motivation to combine. See, e.g., In re Rouffett, 149 F.3d 1350,

47 U.S.P.Q.2d 1453 (Fed.Cir. 1998). Because the suggestion to combine requirement stands as a “critical safeguard against hindsight analysis and rote application of the legal test for obviousness,” the examiner must “explain the specific understanding or principle within the knowledge of a skilled artisan that would motivate one with no knowledge of [applicant’s] invention to make the combination.” Id. Thus, even if Koga’s teachings had some relevance to the invention of claim 1, which they do not under any reading of its plain language, the examiner has not made a legally sufficient showing of the motivation to combine Koga with Wallace.

Therefore, the examiner’s rejection of independent claim 1, and its dependent claims 2, 7, 10, 13, and 14, as obvious over Wallace in view of Koga fails as a matter of law and must be withdrawn. For at least the same reasons, the related rejections of claims 3, 4, and 8 as obvious over the combination of Wallace and Koga in further view of U.S. Patent No. 6,434,366 to Harrison et al. also fail as a matter of law. The rejection of claim 12 as obvious over the combination of Wallace and Koga in further view of U.S. Patent No. 6,144,711 to Raleigh et al. similarly fails. It is believed that claim 1 and its dependent claims 2-14 all are allowable over the cited references.

Next, the examiner rejects claims 15-17, 19-24, 41-43, 46, 51-55, 58-60, 63, and 64 under 35 U.S.C. § 103(a) as obvious over Wallace in view of Harrison. Applicant notes that in the text of the examiner’s action letter—see p. 7, third paragraph—the examiner bases the obviousness rejection not on Wallace in combination with Harrison, but on the combination of Wallace, Koga, and Harrison.

In any case, Wallace, Koga, and Harrison taken in any combination or sub-combination do not teach or suggest the claimed invention, because the attempted

combinations do not work as the examiner alleges, and because the examiner makes no showing whatsoever that any motivation exists to make the argued-for combinations (even assuming such combinations would be operative).

Basically, the examiner's argued-for-rejection is based on the following logic: (1) take receiver diversity combining weights from Koga, which do not in any way address the transmit signal interplay between intended and non-intended signals at other receivers, and (2) combine them with the multiple transmitters of Wallace in some unexplained way for some unexplained benefit, and (3) add to that mismatch the directional antenna teachings of Harrison, which simply discloses that directional radiation patterns can be formed in multi-element transmitter arrays by doing per-element weighting of the signals being transmitted. Even if Koga worked in the context of Wallace, the combination would not yield the present invention as claimed. Adding the directional radiation teachings of Harrison brings the combination no closer to the claimed invention.

To bring the distinctions of the instant invention into sharper relief regarding the cited references, Applicant has amended claim 15 to include the following limitation, "generating a plurality of transmit signals by forming weighted combinations of said information signals based on channel estimates for propagation paths between said one or more transmitters and said plurality of receivers, wherein said weighted combinations are formed in consideration of the propagation paths such that, at each receiver, the information signals not intended for the receiver tend to cancel, and the information signals intended for the receiver tend to add...."

Applicant believes that claim 15 as amended and its dependent claims 16-40 are allowable over the cited references. Similar limitations were added to independent claims 51 and 55 and these claims and their dependents also are believed to be allowable over the cited art. Claim 41 as originally filed already included the limitation of “pre-filtering information signals for one or more receivers using channel estimates representing propagation channels between two or more transmitters and said one or more receivers to form two or more transmit signals, such that said transmit signals combine at said one or more receivers to reduce interference between information signals.” Thus, claim 41 and its dependents are believed to be allowable for the same reasons.

Regarding the rejection of claim 46 on the same grounds, claim 46 includes the limitations of:

- forming a matrix of elements, each element being a multi-valued element describing the propagation path from one of said transmitting stations to one said receivers;
- forming an inverse of said matrix comprising an adjoint matrix and a determinant;
- determining the frequency response from a signal input in said communications network to a receiver for which the signal applied to said signal input is intended, assuming said inverse matrix is used for filtering and combining said applied signals to obtain signals for transmission from respective transmitting stations;
- forming said applied signal based on information to be transmitted to said intended receiver and said frequency response so that the information is coded in said applied signal to produce a spectrum of the applied signal that is efficient for transmitting said information to said intended receiver.

The examiner states that Wallace discloses forming an “applied signal based on information to be transmitted to said intended receiver and said frequency response so that the information is coded in said applied signal to produce a spectrum of the applied

signal that is efficient for transmitting said information to said intended receiver.” This statement is incorrect and goes against the plain language of Wallace. The several sections referred to by the examiner, Wallace never states that signals to be transmitted are being coded to produce a desired spectrum in consideration of channel frequency response.

In fact, Wallace explicitly states that in the context of the operations referred to by the examiner, Orthogonal Frequency Division Multiplexing (OFDM) is being used to make the transmit signals sufficiently narrowband such that each one “sees” flat frequency fading in its corresponding subchannel—see Wallace, col. 13, lines 5-15. There is no need to employ the technique claimed in claim 46 of the instant application where the transmit signal spectrum inherently is narrowband like in Wallace such that it enjoys flat frequency fading. Indeed, the point in claim 46 is that absent the claimed processing, the signal's spectrum would be inefficient relative to the non-flat frequency fading that the signal would otherwise be expected to suffer. Thus, Wallace teaches away from the claimed invention by explicitly indicating the desirability of using OFDM to obtain narrowband signals that inherently see flat frequency fading.

Despite this shortcoming of Wallace, the examiner argues that he achieves the claimed invention by adding the teachings of Koga and Harrison to Wallace, and that the motivation for making that combination is that it “would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Wallace and Koga, and pre-filter, as taught by Harrison, thus allowing the system to not use high power per user pilots to estimate the propagation characteristics, as discussed by Harrison (col. 1 lines 44-57, col. 2 lines 30-41). Applicant simply notes that this is

another conclusory motivation to combine argument of the kind that consistently is deemed legally insufficient by the Federal Circuit. Further, the argued-for motivation does not make sense because the "missing pilot" problem in Harrison is not relevant to Applicant's invention and thus cannot provide any motivation to combine Harrison with Wallace and Koga with an eye toward achieving the invention of claim 46.

Regarding claims 18, 25, 34, 37-40, 56, and 57, the examiner rejects them under 35 U.S.C. § 103(a) as being obvious over Wallace in combination with Harrison in further view of Raleigh. The examiner uses Raleigh because it mentions signal polarizations but beyond that, it is difficult to see how Raleigh is relevant to the present invention. In any case, because Wallace and Harrison taken separately or in combination do not teach or suggest the invention as claimed, the addition of Raleigh does not save the examiner's stated rejections from failing as a matter of law.

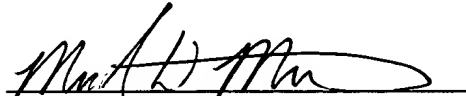
Similarly, because the examiner rejects claim 23 as obvious over the combination of Wallace and Harrison in further view of U.S. Patent No. 6,594,473 to Dabak et al., Dabak is added to the mix apparently because it mentions Time Division Multiple Access (TDMA). However, because Wallace and Harrison taken separately or in combination do not teach or suggest the invention as claimed, the addition of Dabak to the mix does nothing to save the examiner's rejection from failing as a matter of law.

In summary, claims 1-64 are pending, including independent claims 1, 15, 41, 46, 51, and 55. In light of the above arguments and selected claim amendments presented herein, it is believed that all independent claims and, thus, all their dependent claims, stand in condition for allowance. Respectfully, Applicant requests that the examiner withdraw all outstanding rejections and reconsider all pending claims. The examiner is

encouraged to call the undersigned agent if the examiner believes that would aid the quick resolution of any remaining issues.

Respectfully submitted,

COATS & BENNETT, P.L.L.C.

A handwritten signature in black ink, appearing to read "Michael D. Murphy", is written over a horizontal line.

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